



Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Establishing a Refuge Population of Endangered Humpback Chub (*Gila cypha*) at the Dexter National Fish Hatchery and Technology Center

2009 Progress Report



March 2010

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
City of Bullhead City
City of Lake Havasu City
City of Mesa
City of Somerton
City of Yuma
Electrical District No. 3, Pinal County, Arizona
Golden Shores Water Conservation District
Mohave County Water Authority
Mohave Valley Irrigation and Drainage District
Mohave Water Conservation District
North Gila Valley Irrigation and Drainage District
Town of Fredonia
Town of Thatcher
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Salt River Project Agricultural Improvement and Power District
Unit "B" Irrigation and Drainage District
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users' Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Other Interested Parties Participant Group

QuadState Local Governments Authority
Desert Wildlife Unlimited

California Participant Group

California Department of Fish and Wildlife
City of Needles
Coachella Valley Water District
Colorado River Board of California
Bard Water District
Imperial Irrigation District
Los Angeles Department of Water and Power
Palo Verde Irrigation District
San Diego County Water Authority
Southern California Edison Company
Southern California Public Power Authority
The Metropolitan Water District of Southern California

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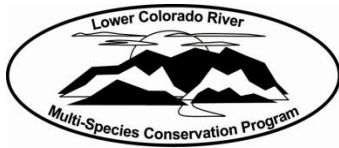
Colorado River Commission of Nevada
Nevada Department of Wildlife
Southern Nevada Water Authority
Colorado River Commission Power Users
Basic Water Company

Native American Participant Group

Hualapai Tribe
Colorado River Indian Tribes
Chemehuevi Indian Tribe

Conservation Participant Group

Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
The Nature Conservancy



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Prepared by:

Manuel E. Ulibarri¹ and William Knight²

Dexter National Fish Hatchery and Technology Center, U.S. Fish and Wildlife Service,
PO Box 219, 7116 Hatchery Road, Dexter, New Mexico 88230-0219; phone: 575-734-5910,
FAX: 575-734-6130

¹ Manuel_Ulibarri@fws.gov

² William_Knight@fws.gov

Lower Colorado River
Multi-Species Conservation Program
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada
<http://www.lcrmscp.gov>

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ACRONYMS AND ABBREVIATIONS

Dexter	Dexter National Fish Hatchery and Technology Center
ESA	Endangered Species Act
km	kilometer(s)
LCR	Little Colorado River
mm	millimeter(s)
PIT	passive integrated transponder
ppm	parts per million
USFWS	U.S. Fish and Wildlife Service

Symbols

°C	degrees Celsius
%	percent

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INTRODUCTION

The humpback chub (*Gila cypha*) is listed as endangered under the Endangered Species Act (ESA) of 1973, as amended. The species is endemic to the Colorado River Basin of the southwestern United States. Six extant wild populations are known: (1) Black Rocks, Colorado River, Colorado; (2) Westwater Canyon, Colorado River, Utah; (3) Yampa Canyon, Yampa River, Colorado; (4) Desolation/Gray Canyons, Green River, Utah; (5) Cataract Canyon, Colorado River, Utah; and (6) the main stem Colorado River in Marble and Grand Canyons and the Little Colorado River, Arizona. The first five populations are in the Upper Colorado River Basin (i.e., upstream of Glen Canyon Dam, Arizona), and the sixth population is in the Lower Colorado River Basin (U.S. Fish and Wildlife Service [USFWS] 2002).

Developing a captive population (refugia) is a feasible option for protecting and/or enhancing the wild population of humpback chub in the Grand Canyon as outlined in the Humpback Chub Recovery Plan (USFWS 1990). In 2009, the USFWS proposed to begin establishing a refuge population of Grand Canyon humpback chub at the Dexter National Fish Hatchery and Technology Center (Dexter), Dexter, New Mexico, (now known as the Southwestern Native Aquatic Resources and Recovery Center) in collaboration with the Bureau of Reclamation, USFWS Arizona Fish and Wildlife Conservation Office, and the National Park Service in fulfillment of Work Task C14 under the fish augmentation portion of the Lower Colorado River Multi-Species Conservation Program. Dexter contains the expertise, infrastructure, security, and biohazard backup systems to provide appropriate care for the fish and reduce risk of loss. The purpose of this project is to employ a conservation and management action to protect the species against potential future catastrophic loss in its primary habitat in the Little Colorado River (LCR). A refuge population of humpback chub is essential to help meet future species' needs due to the recent decline of the Grand Canyon population to its lowest level in over a decade. The genetic refuge and captive propagation program to be developed and implemented at Dexter will follow the guidelines outlined in the September 5, 2008, draft USFWS "Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin." The plan includes a broodstock management strategy for the Grand Canyon population.

This project is conducted under the authority of the ESA. The USFWS's "Policy Regarding Controlled Propagation of Species Listed under the Endangered Species Act" (65 FR 56916) addresses the housing of refuge populations as well as captive propagation activities. All of the safeguards recommended in said policy will be followed, with the ultimate goal being to protect the genetic integrity of wild humpback chub.

PROJECT GOAL

The goals of this project are to: (1) establish and maintain a humpback chub refuge stock from fish collected from the LCR, (2) maintain the stock in a secure environment, and (3) protect against catastrophic loss in the wild or captivity and ensure the stock is available for propagation to augment the wild population if the need arises.

OBJECTIVES

The objectives of this project include:

1. Develop, maintain, and staff facilities at Dexter necessary to implement refuge stock requirements identified in the Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin (USFWS 2008).
2. Establish a 500 to 1,000 adult fish refuge stock from fish collected from the LCR (2008–2012).
3. Transfer (38-99YC) adult humpback chub from Willow Beach National Fish Hatchery to Dexter.
4. Evaluate and refine fish culture, marking, and transport methodologies for wild caught humpback chub.
5. Complete acute toxicity tests on humpback chub larvae and juveniles (90–160 millimeters [mm]) to determine median lethal concentration (LC50) of potassium chloride. Potassium chloride will be used to disinfect fish, facilities, and vehicles to rid them of Quagga mussel.

STUDY AREA

All fish culture and maintenance activities were completed at Dexter, located in the Pecos River Valley of southeastern New Mexico, which is approximately 200 miles southeast of Albuquerque, 20 miles south of Roswell, and 1 mile east of Dexter on State Road 190. This project utilizes as many as eleven 3-foot-diameter fiberglass tanks and associated systems in the newly built isolation/quarantine building and two 10-foot rectangular fiberglass tanks in the fish culture building. Once the fish reach the target passive integrated transponder (PIT) tagging size, they will be reared and maintained in one 40-foot outdoor raceway and two 0.10–0.25 surface acre outdoor lined ponds.

METHODS

Project partners collected 300+ (50–120 mm total length) humpback chub from the LCR, Grand Canyon, in late July/early August. The age-0 fish were collected in the lower 3 kilometers (km) of the river, upstream from the confluence with the main stem Colorado River on Navajo Nation lands. Following collection, the fish were transported to the Dexter by truck for quarantine and eventual incorporation into the refuge stock. All fish were handled with the best animal husbandry practices available. Transport followed guidelines described in the USFWS Protocols for Biological Investigations developed by Dr. Gary Carmichael, a retired USFWS employee. Upon arrival, Dexter staff provided onsite monitoring for the species. The fish were counted and placed in 3-foot-diameter fiberglass tanks for disease treatment and quarantine for 6 months. Nylon tank covers were placed on all tanks to stop the fish from jumping out. Aeration and oxygen were supplied to the tank to ensure that oxygen levels were maintained at ≥ 6 parts per million (ppm). The fish were treated twice with Praziquantel at 2 ppm for 24 hours in a static bath to control and remove cestodes. Dexter staff also administered 1-h salt baths (uniodized) followed by a static bath treatment of formalin at 125–150 ppm to control external bacteria, parasites, and aquatic invasive species. These procedures continued for several weeks depending on the life cycle of the parasite being treated. A daily log recording water quality, temperature, treatments, and comments on fish health was maintained.

Following completion of the quarantine period and 2 weeks prior to being moved to outdoor raceways, each fish was marked with a PIT tag and a tissue sample collected for future genetic identification and differentiation from natural recruitment that may occur in the rearing units. Staff monitored water quality (dissolved oxygen, pH, conductivity, and temperature) daily using a YSI water quality meter and recorded all water quality parameters, observations, and mortalities daily. Fish were fed a combination of live, frozen, and formulated feeds.

PROJECT RESULTS

On October 12–13, 2008, Dexter began the development of a humpback chub refuge population. Manuel Ulibarri transported 597 fish back to Dexter from the State of Arizona, Bubbling Ponds Native Fish Facility, near Cornville, Arizona. The fish were collected near Boulder Camp on the LCR (table 1) by a multi-agency group coordinated by personnel from the USFWS Fish and Wildlife Conservation Office – Flagstaff, the National Park Service, and the Grand Canyon Wildlands Council. Upon arrival at Dexter, the fish were placed in quarantine following a slow water exchange to acclimate them to their new home. The fish were counted into six 3-foot circular round tanks containing a 0.5 percent (%)

**Establishing a Refuge Population of Endangered
Humpback Chub (*Gila cypha*) at the Dexter NFH&TC**

Table 1.—Date, size, and number of humpback chub collected from the LCR in 2008

Collection date	<80 mm	80–130 mm
July 17–20	(40–60 mm) 195	
October 8	48	36
October 9	169	120
October 10	10	19
Total	422	175

salt solution; larger fish were sorted into a separate tank. No immediate mortalities were observed during or after transport. The fish were quarantined for 4 weeks and received scheduled treatments for internal and external parasites and bacteria.

On January 5, 2009, Dexter staff inventoried and transferred 593 fish to the east bay of the fish culture building (table 2). Five additional 3-foot-diameter tanks were used to spread the fish out. Water flows in the tanks were adjusted to 0.26 foot per second velocities to provide the initial flow training. The water temperature was gradually increased from 18 degrees Celsius (°C) to 22.5 °C to enhance feeding and growth. Four mortalities were recorded during the 87-day rearing period (table 3).

Table 2.—Full inventory of humpback chub at Dexter

Tank number	Number per tank	Mean length (mm)	Mean weight (grams)
5D	50	87.2	5.55
6D	50	71.6	3.11
7D	80	147.3	25.5
8D	46	81.5	4.48
9D	80	133	19.6
10D	46	81.5	4.48
6E	50	96.7	7.74
7E	49	84.3	4.92
8E	46	81.5	4.48
9E	50	87.9	5.78
10E	46	81.5	4.48
Total	593		

**Establishing a Refuge Population of Endangered
Humpback Chub (*Gila cypha*) at the Dexter NFH&TC**

Table 3.—Humpback chub mortalities

Date	Number of mortalities
October 20, 2008	1
November 24, 2008	1
December 15, 2008	1
January 6, 2009	1
Total	4

On January 15, 2009, Dexter received the remaining 38 humpback chub broodfish and 37 F1s from Willow Beach National Fish Hatchery, Willow Beach, Arizona. The fish were quarantined for 60 days, treated for potential disease, pathogens, and aquatic invasive species, and released into a 1/10-acre lined pond. These fish were part of a collection of wild age-0 humpback chub taken from the LCR in July 1999 to conduct temperature/growth studies. They were captured at Salt Camp, which is approximately 10 km upstream of the confluence with the Colorado River, and transported to the Willow Beach National Fish Hatchery. Dexter is currently holding this group of fish separate from the 08 year class until genetic screening is completed to determine if they can be added to the refuge stock.

In April 2009, all the age-1 fish collected in July and October 2008 were PIT tagged with 125-kilohertz tags. Tagging in early April allowed for ample time for healing of the injection site and recovery from the handling stress. Dexter staff achieved (98%) tag retention over the 2-month period. On June 14, 2009, 300 PIT tagged humpback chub were shipped to Shinumo Creek, Grand Canyon National Park, to begin the Shinumo Creek Humpback Chub Translocation Project. Dexter staff transported the fish by truck to the park entrance where they were loaded into large coolers and flown by helicopter to a landing site near Base Camp at Shinumo Creek. The remaining 293 age-1 humpback chub were kept at Dexter to start the captive refuge population. No transport mortalities occurred in the fish shipped to Shinumo Creek, and all the fish appeared healthy on arrival. They were released into the creek at four locations.

On July 23, 2009, Dexter received its second batch of age-0 humpback chub collected from the LCR, Grand Canyon. A total of 282 fish were received. Six mortalities were recorded the following day, and one additional mortality was recorded over the past 6 months. Dexter is maintaining 275 fish from this effort; 200 will be added to the captive refuge population and the remainder provided for a second translocation effort into Shinumo Creek in 2010.

DISCUSSION

Indoor and outdoor facilities were used at Dexter to maintain and culture the fish. This year marks the first year of a 3-year agreement and 5-year program to develop and establish a humpback chub refuge population at Dexter. Year one yielded excellent results with 593 fish surviving and reaching the PIT tagging target size in 6 months. Overall survival for this group of fish was 99.3% with an average daily growth rate of 0.21 mm per day. At the time of tagging, the fish averaged 128 mm in total length and 18.61 grams each. Additional work completed in 2009 included the development of PIT tagging protocols for the species (attachment 1) and completion of the draft USFWS Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin.

PROPOSED SCHEDULE

In 2010, Dexter will continue developing and maintaining the humpback chub refuge population. The goal is to reach 1,000 unique wild caught individuals by 2012. To date, the refuge stock at Dexter consists of 477 fish from the 2008 and 2009 year classes. The program is well on track to building the 1,000 fish refuge stock by 2012. Dexter staff will also initiate acute toxicity tests on humpback chub larvae and juveniles (90–160 mm) to determine median lethal concentration (LC50) of potassium chloride.

Dexter National Fish Hatchery and Technology Center budget

Project charges:	
17% administrative overhead	\$9,218.36
O&M labor costs	\$7,030.70
Materials and supplies	\$6,177.61
Fish health	\$4,613.23
Feed	\$8,697.71
Utilities and equipment maintenance	\$870.39
Travel	\$386.00
Total expended as of March 2010	\$36,994.00
Projected charges:	
O&M labor costs	\$15,000.00
Materials and supplies	\$1,450.00
Fish health	\$1,500.00
Utilities and equipment maintenance	\$7,500.00
Travel	\$1,000.00
Total projected costs	\$26,450.00
Total project funds for 2009	\$63,444.00

LITERATURE CITED

- U.S. Fish and Wildlife Service (USFWS). 1990. Humpback chub (*Gila cypha*) Recovery Plan: U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.
- _____. 2002. Humpback chub (*Gila cypha*) Recovery Goals: Amendment and Supplement to the Humpback Chub Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.
- _____. 2008. Genetic Management Plan for Captive and Translocated Endangered Humpback Chub in the Lower Colorado River Basin (draft). U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado. September 5.

ATTACHMENT 1

Humpback Chub Tagging, Sampling Methodologies, and Treatment Protocols: Dexter National Fish Hatchery and Technology Center

All humpback chub will be tagged nonlethally following a >6-month acclimatization period at Dexter National Fish Hatchery and Technology Center. All humpback chub are to be tagged nonlethally in a solution of 100 milligrams per liter of MS-222 (378 milligrams per gallon) and 0.5 percent (%) salt (18.9 grams per gallon), and fish will be out of water for a maximum of 30 seconds.

1. *Fish tagging and marking:* All fish will be taken off feed 48 hours prior to tagging. Only anesthetized humpback chub are to be tagged or marked. All procedures should be nonlethal. Passive integrated transponder (PIT) tags will be placed intraperitoneal with insertion occurring medial to a pelvic fin. All injection needles and PIT tags will be dipped in alcohol, and all wound sites will be swabbed with Betadine to prevent potential infection.
2. *Length/weight, meristics, morphology, and other physical measurements:* When handled and examined, wet platform scales and wet meter boards will be used on anesthetized humpback chub. The time that anesthetized fish will be on wet meter boards and scales will not exceed 30 seconds. Following PIT tagging, measuring, and data collection, all fish will receive daily static bath treatments of 0.5% salt and 15 parts per million oxytetracycline or furacin for a 6- to 8-hour duration for 2 consecutive days to relieve handling stress and prevent potential infection of the injection site.